HEAT PIPE STRUCTURE

BACKGROUND OF THE INVENTION

The present invention relates to a heat pipe structure, and more particular, to a heat pipe structure of which a wick structure is attached to an inner surface of an end portion thereof such that a heat pipe can be used to contact a heat source with the end portion for dissipation.

Heat pipes have been commonly used for dissipating heat generated by electronic products. The heat pipes have high thermal conducting ability, high thermal transmission, high thermal conductivity, light weight, non-mobile device, simple structure and versatile applications.

As shown in Figure 1, the conventional heat pipe structure 1a includes two conoid ends converged from the tubular member 10a. One of the conoid end 11a is formed by soldering after a wick structure 13a is attached to an interior wall of the tubular member by a supporting member 12a. The wick structure 13a is includes a screen mesh with capillary function which is advantageous for transmission of working fluid in the heat pipe 1a.

However, the conoid ends of the heat pipe 1a do not have wick structure attached or with incomplete attachment. Therefore, conventional heat pipes can not use the end portion to contact the heat sink or heat source for dissipating.

BRIEF SUMMARY OF THE INVENTION

The present invention provides a heat pipe structure of which the wick structure is attached to the inner surface of the end portion thereof such that the heat pipe can be used to contact a heat source with the end portion for dissipation. Therefore, more availability for dissipating of the heat pipe can be obtained and further the limitation in use can be reduced too.

The heat pipe structure provided by the present invention includes a tubular member, and a wick structure having a base portion formed at one end of the tubular member and a surrounding portion extending from the base portion for attaching to an interior wall of the tubular member. As such, an end portion of a heat pipe can be used to contact a heat source for dissipation.

These and other objectives of the present invention will become obvious to those of ordinary skill in the art after reading the following detailed description of preferred embodiments.

It is to be understood that both the foregoing general description and the following detailed description are exemplary, and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

These, as well as other features of the present invention, will become apparent upon reference to the drawings wherein:

Figures 1 shows a cross sectional view of the conventional heat pipe;

Figure 2 shows a cross sectional view of an exploded heat pipe according to the present invention;

Figure 3 shows a cross sectional view of the assembled heat pipe according to the present invention;

Figure 4 shows a perspective view of a wick structure according to the first embodiment;

Figure 5 shows a perspective view of a wick structure according to the second embodiment;

Figure 6 shows a cross sectional view of the first supporting member in Figure 2;

Figure 7 shows a cross sectional view along line 7-7 of Figure 6;

Figure 8 shows a cross sectional view of the second supporting member in Figure 2; and

Figure 9 shows a cross sectional view along line 9-9 of Figure 8.

DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers are used in the drawings and the description to refer to the same or like parts.

Figures 2 and 3 illustrate cross sectional views of the exploded and assembled heat pipe the present invention, respectively. As shown, the heat pipe 1 includes a tubular member 10, a bottom portion 11, a lid 12, a first support member 13 and a second support member 14.

The tubular member 10 is hollow and includes two openings 100, 101 at both ends connecting to the bottom portion 11 and the lid 12, respectively. The bottom portion 11 has an inner surface 110 and an outer surface 111. The inner surface 110 can be formed as a plane surface, a conical surface, a convex surface or a concave surface. Further, the bottom portion 11 can be integratedly formed with the tubular member 10. The lid 12 includes a through hole 120 for an injection tube 121 being installed therein so that the working fluid can be filled into the heat pipe thereby.

Furthermore, a wick structure 102 having a base portion 103 and a surrounding portion 104 extending therefrom is mounted inside the tubular member 10 of the heat pipe 1. The base portion 103 is attached to the inner surface 110 of the bottom portion 11 and the surrounding portion 104 is attached to the interior wall of the tubular member 10. Please refer to Figures 4 and 5, which show different wick structures according to a first and a second preferred embodiments of the present invention. As shown in Figure 4, the

surrounding portion 104 of the wick structure 102 is formed as a skirt structure including a plurality of frills 105. The skirt structure of the surrounding portion 104 is formed by folding the frills 105 upwards from the base portion 103. In another embodiment, as shown in Figure 5, the surrounding portion 104 of the wick structure 102 includes a plurality of strips 106 with smoother surface after the wick structure 102 is mounted to the heat pipe by sintering.

Figures 6 and 7 illustrate the cross sectional view of the first support member and the cross sectional view along line 7-7 of Figure 6, respectively. The support member 13 installed inside the tubular member 10 includes a pressing plate 130 and an elastic arm 131 extending therefrom. The pressing plate 130 is for pressing the base portion 103 of the wick structure 102 on the inner surface 110 of the bottom portion 11 of the heat pipe 1. The elastic arm 131 is for pressing the surrounding portion of the wick structure 102 on the interior wall of the tubular member 10 of the heat pipe 1. The elastic arm 131 can provide auxiliary force to secure the attachment of the wick structure 102 to the bottom portion 11. Further, the first support member 13 includes a plurality of holes 132 on the pressing plate 130 and the elastic arm 131 for the working fluid flowing therethrough.

Figures 8 and 9 illustrate the cross sectional view of the second support member and the cross sectional view along line 9-9 of Figure 8, respectively. The second support member 14 is also installed inside the tubular member 10, and is formed by curling a resilient sheet 140 with a plurality of holes 141 thereon or formed as a spiraling spring (not shown). The second support member 14 is mounted between the elastic arm 131 of the first support member 13 for further securing the surrounding portion 104 of the wick structure 102 being attached to the tubular member 10. Meanwhile, if there is no first support member 13, the second support member 14 can be directly mounted inside the

tubular member 10 to press the surrounding portion 104 being attached to the tubular member 10.

As such, according to the above description, the heat pipe structure of the present invention is obtained.

Finally, as shown in Figure 3, the bottom portion 11 of the heat pipe 1 can be used to contact the heat source with the outer surface 111. The working fluid near the bottom portion 11 is gradually evaporated and then condensed to liquid on the interior wall of the tubular member 10. Thereafter, the liquid working fluid flows back to the bottom portion 11 and is heated to evaporate again. As such, the heat pipe 1 of the present invention can use an end portion for heat conduction and dissipation to provide more efficient dissipation and reduce the limitation in use of the heat pipe. The heat pipe structure of the present invention is more suitable to be used for the central processing unit (CPU) of a computer because the end portion of the heat pipe can be directly contact to the CPU for dissipation.

This disclosure provides exemplary embodiments of the present invention. The scope of this disclosure is not limited by these exemplary embodiments. Numerous variations, whether explicitly provided for by the specification or implied by the specification, such as variations in shape, structure, dimension, type of material or manufacturing process may be implemented by one of skill in the art in view of this disclosure.